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(54) **DEPLOYMENT METHODS AND MECHANISMS FOR MINIMALLY INVASIVE IMPLANTATION OF HEART CONTACTING CARDIAC DEVICES**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,826,193 A 3/1958 Vineberg
3,034,501 A 5/1962 Hewson
(Continued)

FOREIGN PATENT DOCUMENTS

WO 9922784 A1 5/1999
WO 0036995 A2 6/2000
(Continued)

OTHER PUBLICATIONS

Ghanta, R.K., et al, "Adjustable, Physiological Ventricular Restraint Improves Left Ventricular Mechanics and Reduces Dilation in an Ovine Model of Chronic Heart Failure," Mar. 13, 2007, Circuilation (10):Dec. 1, 2010.
(Continued)

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(57) **ABSTRACT**

The present invention provides methods, systems, kits, and devices that aid in the positioning of a direct cardiac compression device about the heart.

7 Claims, 12 Drawing Sheets